CHEMICAL & ENGINEERING NEWS

C&EN

JUNE 8, 1992

A1850-1

BIOTECH STOCKS PLUNGE AFTER STRONG GAINS LAST YEAR PAGE 18

POLAND STRUGGLES TO RESTRUCTURE SCIENCE & TECHNOLOGY

PAGE 7

CHEMICAL & ENGINEERING NEWS

C&EN

JUNE 8, 1992

NEWS OF THE WEEK

- Scientists at Scripps Research Institute create the first mirror-image version of a naturally occurring enzyme. **Page 4**
- Supreme Court issues two decisions that prohibit states from selectively restricting the amounts of hazardous or other waste imported into them. **Page 5**
- Witnesses debate actions proposed in technology and competitiveness act at House subcommittee hearing. **Page 5**
- Full-size replicas of two modules of NASA's space station *Freedom*, scheduled to tour the country, went on display at the U.S. Capitol. **Page 6**
- Although plastics recycling increased significantly in 1991, finding markets for recycled materials is proving to be difficult. **Page 6**

Volume 70, Number 23
CENEAR 70 (23) 1–56
ISSN 0009-2347

BUSINESS

Biotechnology company stock values plunged after reaching all-time highs in late 1991 and early 1992, but the market shows some signs of recovery. **Page 18**

GOVERNMENT

NIH's request to patent parts of genes has drawn cries of foul from U.S., foreign groups worried over effect such a move would have on human genome project, other research. **Page 21**

Tussle over definition of waste stream delays changes to Form R, the document companies must use to report to EPA emissions regulated by Toxics Release Inventory law. **Page 22**

SCIENCE/TECHNOLOGY

Centenary of Emil Fischer's determination of glucose configurations that helped establish the validity of the tetrahedral carbon atom theory is celebrated. **Page 25**

BOOKS

Fourth edition of "Kirk-Othmer Encyclopedia of Chemical Technology" is previewed after publication of first two volumes, which only cover subjects starting with *A*. **Page 27**

ACS NEWS

Official reports of various ACS committee meetings during the spring national meeting in San Francisco. **Page 28**

MEETINGS

ACS call for papers lists deadlines and topics of ACS meetings from 1992 to 2001. **Page 34**

NEWS FOCUS

Poland is grappling to craft a new policy for science and technology—hard going for a country already burdened with major political and economic problems and lacking an overall development plan. Page 7

LETTERS 2

CONCENTRATES

Business 16

Government 20

Science/Technology 24

THE DEPARTMENTS

People 32

Newscripts 56

Chemical & Engineering News
1155—16th St., N.W., Washington, D.C. 20036

Editor: Michael Heylin (202) 872-4501
Assistant Managing Editors: James H. Krieger, Janice R. Long, Rebecca L. Rawls, Donald J. Soisson, William J. Storck
Staff Editor: Ernest L. Carpenter
Senior Correspondents: Earl V. Anderson, Lois Ember, Wilbert C. Lepkowski
News Editor: Richard J. Seltzer
Senior Editors: New York: Stephen C. Stinson; Chicago: Joseph Haggin; London: Patricia L. Layman; Washington: Stuart A. Borman, Mairin B. Brennan, Doron Dagani, Bette Hileman, Pamela S. Zurer
Associate Editor: Ann Marie Menting
Assistant Editor: Jane K. Baker
Service Departments Editor: Dolores Miner
Editing Services: Arlene Goldberg-Gist (Head), Rita E. Johnson (Editorial Assistant), Patricia Oates (Administrative Assistant)
News Bureaus: Northeast News Bureau: (908) 906-8300 Ann M. Thayer (Head), Marc S. Reisch (Associate Editor), Rachel Eskenazi (Administrative Assistant). Houston: (713) 984-8162 Susan J. Ainsworth (Associate Editor). Washington: (202) 872-4495 David J. Hanson (Head). West Coast: (510) 653-3630 Rudy M. Baum (Head). **Foreign Bureau:** London: (01) 540-0414 Dermot A. O'Sullivan (Head)
Graphics and Production: Leroy Corcoran (Head). Barbara Fryer (Art Director). Linda Mattingly (Staff Artist). Diane Kelly (Costing)
Composition Systems Administrator: Vincent L. Parker. **Assistant:** Robin L. Shapiro
Business Manager: Arthur Poulos
Circulation Director: David Schulbaum

ADVISORY BOARD: F. Peter Boer, George Castro, Renée G. Ford, Louis J. Glunz, Kenneth G. Hancock, Harry S. Hertz, Cynthia A. Maryanoff, Linda B. McGown, David A. Shirley

Published by
AMERICAN CHEMICAL SOCIETY
(202) 872-4600; TDD (202) 872-4432
John Kistler Crum, Executive Director
Robert H. Marks, Director, Publications Division

PUBLISHING BOARD: Ned D. Heindel *(Chairman); Board of Directors Chairman:* Joseph A. Dixon; *President:* Ernest L. Eliel; Richard L. Deming; Judith C. Giordan; William P. Jencks; and Gary J. Long

Subscription & Member Record Service: Send all new and renewal subscriptions with payments to: ACS, Dept. L-0011, Columbus, Ohio 43268-0011. Correspondence and telephone calls for changes of address, claims for missing issues, subscription orders, status of records and accounts should be directed to: Manager, Member & Subscriber Services, ACS, P.O. Box 3337, Columbus, Ohio 43210; (800) 333-9511 or (614) 447-3776.

For changes of address, include both old and new addresses with ZIP code numbers and mailing label from a recent issue. Allow four weeks for change to become effective. Claims for missing numbers will not be allowed if loss was due to failure of notice of change of address to be received in the time specified; if claim is dated (a) North America: more than 90 days beyond issue date, (b) all other foreign: more than one year beyond issue date; or if the reason given is "missing from files."

Subscription Rates 1992: Printed editions: nonmembers U.S. 1 yr. $105, 2 yr. $189; outside U.S. 1 yr. $141, 2 yr. $261. Air freight rates available on request. Rates above do not apply to nonmember subscribers in Japan, who must enter subscription orders with Maruzen Co. Ltd., 3–10 Nihonbashi 2-chome, Chuo-ku, Tokyo 103, Japan. Tel: (03) 272-7211. Single copies: Current $15. Rates for back issues and volumes are available from Microforms & Back Issues Office, ACS, 1155—16th St., N.W., Washington, D.C. 20036. Back and current issues available on microfilm and microfiche. Rates on request from Microform Program, ACS.

Chemical & Engineering News (ISSN 0009-2347) is published weekly except for the last week in December by the American Chemical Society at 1155—16th St., N.W., Washington, D.C. 20036. Second-class postage paid at Washington, D.C., and additional mailing offices. POSTMASTER: Send address changes to Chemical & Engineering News, Membership & Subscription Services, P.O. Box 3337, Columbus, Ohio 43210. ACS assumes no responsibility for the statements and opinions advanced by the contributors to its publications.

Advertising Management: CENTCOM LTD.
(For list of offices see page 55)

Office of Ombudsman: (800) ACS-5558, No. 8–5
© Copyright 1992, American Chemical Society
Canadian GST Reg. No. R127571347

LETTERS

More credit for school projects

I would like to add some information regarding a caption (C&EN, April 20, page 56) on a photograph of schoolchildren's projects described as an "Invention Convention." The event was officially given the name "Kidvention," chosen in a contest held by the ACS Santa Clara Valley Section.

Also, several additional sponsors joined the activity: the ACS Division of Chemical Education and the College of San Mateo's math-science department. The ACS Division of Chemical Education also cooperated by supplying *Wonder Science* magazines for the participants.

Hubert E. Dubb
Chairman, ACS Committee on Patents & Related Matters

Misconduct in science

This concerns the article on misconduct in science (C&EN, April 27, page 4). The problem with recognizing and apprehending "misconduct" lies in the factors whence the phenomenon arises: failure to apply valid methodology of mathematical statistics. Far too many technologists remain under the misapprehension that a measurement result is a fact, rather than a random number.

As I am sure the editors are aware, a multitude of Gordon Research Conferences convene every summer on the West Coast, as well as at choice spots in New Hampshire. In 1951, the Conference on Statistics in Chemistry & Chemical Engineering was initiated. One of the founders (and an early chairman) was Carl A. Bennett, coauthor (with chemical engineer Norman A. Franklin of the University of Leeds) of "Statistical Analysis in Chemistry and the Chemical Industry" [John Wiley & Sons, New York (1954)]. I attended these conferences off and on for 30 years, starting in 1958. I met Bennett in 1951, about the time of the founding conference. I had gone to Hanford, Wash., to meet him and to elicit guidance about my new assignment in the atomic energy division of my then employer. We renewed our longtime acquaintance at the meeting in 1988.

As a lifelong chemical engineer (after more than 50 years, I can barely recall when I wasn't one), I am well aware that most chemical (physical, biological, medical) technologists are innocent of the hazards of drawing conclusions absent valid statistical procedures. I have worked with groups that proceed blithely performing elaborate, time-consuming measurements with no regard whatever for the consequences of attempting to repeat the result (singular). Thus, it should be no surprise that when competing (substitute whatever adjective and/or noun you prefer) chemists attempt to reproduce reported results, confusion abounds. It is difficult to separate incompetence/chicanery from the background noise.

Frank Vance
San Diego

Job interview—50 years ago

I would like to add my job interview experience to the several published in recent months. Mine goes back more than half a century.

In 1935, I received a rare response and even rarer invitation for an interview from an employer who advertised in C&EN. This was the chemical division of a nationally known manufacturer located in a New England mill town, later to be listed as a Fortune 500 company.

They wanted a control chemist at 50 cents an hour for a 40-hour week. Holidays were unpaid, but could be made up by Saturday work. In those days, you didn't ask about vacation and benefits. At the end of the interview I was told I would not be reimbursed for transportation expense, amounting to $5.00—more than a day's pay. I was also asked my religion.

On entering the plant, I was asked to give up my matches and was given a new book when I left. I didn't get the job.

Bernard Wager
New York City

Unfair to chemical industry

In this time of growing awareness toward our environment and its problems I, among many others, am glad to see that the chemistry community is changing its attitudes. However, we as chemists might want to tell this to the rest of the world.

An advertisement recently appeared

Authorization to photocopy any article for internal or personal use beyond the fair use provisions of the Copyright Act is granted by ACS to libraries and other users registered with the Copyright Clearance Center (CCC), provided that the fee of $3.00 per article copy is paid directly to CCC, 27 Congress St., Salem, Mass. 01970, USA. Copying for other than internal or personal use without express permission of ACS is prohibited. Address requests for customized bulk reprints to ACS Copyright Administrator, 1155—16th St., N.W., Washington, D.C. 20036, or call (202) 872-4367. The CCC Code for C&EN is 0009-2347/92 $3.00.

Biotechnology Stocks Plunge From All-Time Highs

■ ***Loss of half of stock value followed peak early this year and industry's best financing year ever in 1991***

Ann M. Thayer,
C&EN Northeast News Bureau

It's been called a plunge, a correction, and a bloodbath. The nose-diving value of biotechnology stocks since the start of 1992 looks harsh, especially in the light of 1991, the most prosperous financing year in the history of the industry. The enthusiasm toward biotechnology contributed to about $4 billion being raised in 1991 stock offerings and to a market valuation in excess of $35 billion for biotechnology companies. But since reaching all-time highs in late 1991 and early 1992, biotechnology stock prices fell an average of about 50% by late April, and no company is immune, not even the industry leaders.

Amgen, the avowed biopharmaceutical champion with $680 million in revenues and $98 million in earnings in 1991, saw its stock slide downward 36%, from a high of nearly $78 per share in January to about $50 per share by late April. Similarly, stock prices for other notable companies such as Biogen, Chiron, Genzyme, and Synergen fell between 42 and 55% during the same period. Majority ownership by large pharmaceutical partners helped Genentech and Genetics Institute to some extent, since their stock values fell only 18% and 33%, respectively. However, SyStemix, owned 60% by Sandoz, was not spared as it had a 55% drop from January to April. Because biotechnology stocks are event driven, Centocor and Immune Response were hit even harder and saw prices drop about 83% and 67%, respectively, because downturns in their prospects contributed to the already negative outlook.

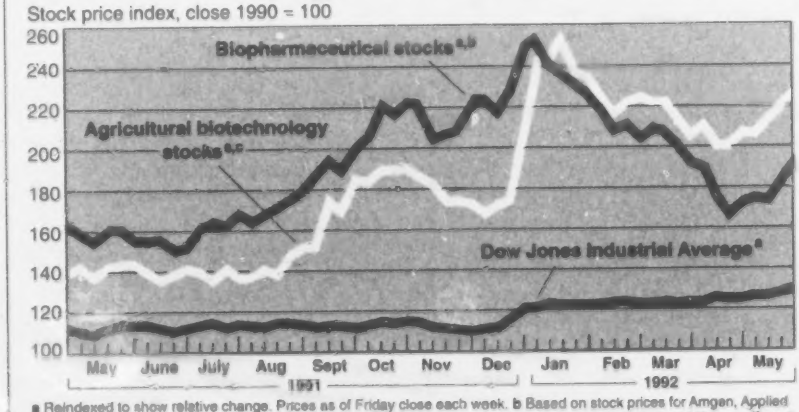
The "correction" in stock prices was not unexpected. In fact, its coming had long been anticipated. Taken as an industry, biotechnology stocks had elevated values, even though most companies had neither products nor profits. Biotechnology stocks had been riding high on the success of a few major companies and their biopharmaceutical products, and investors were looking for another Amgen or Genentech (C&EN, March 30, page 9). Companies such as MedImmune, Immune Response, and SyStemix, which had heady gains of 200 to 300% in stock values following extremely lucrative public offerings in 1991, saw stock prices come crashing down in 1992. Although their stock prices have recovered noticably, they are nowhere near their highs of the past 52-week period.

The C&EN biotechnology stock indexes—on biopharmaceuticals and agricultural companies—both rose about 200% in 1991, reaching highs of 257 (close of 1990 = 100) in January 1992. However, because biotechnology companies are measured in terms of promises and not realities, their stocks are extremely susceptible to disillusionment on the part of investors. This "speculative excess," as it is called by one analyst, set the industry up for a sharp correction in prices. Thus, as investor interest waxed, so too did it wane, and by the end of April, the biopharmaceutical index had dropped to a low of 166. Agricultural biotechnology stocks were also hit but did not drop nearly so far, with the index reaching a low of only about 200.

Investors have been taking their money out of biotechnology stocks and presumably putting it elsewhere. In comparison to the biotechnology stock indexes, the Dow Jones Industrial Average has been hovering near its all-time high for the past several weeks. Biotechnology and health care stocks had been strong in the past few years as a sector of the market with the greatest promise for growth. However, as the stock market grows, sectors other than health care once again become attractive for investment.

The remaining questions are whether biotechnology stocks will drop further or, if recovery is in store, how high they will go again. The strong biotechnology companies with products, and some with profits, have seen stock values rise

Biotech stocks turn back up after average 50% drop



a Reindexed to show relative change. Prices as of Friday close each week. b Based on stock prices for Amgen, Applied Bioscience, Biogen, Centocor, Chiron, Cytogen, Genentech, Genetics Institute, Immunex, Repligen, and Xoma. c Based on stock prices for Calgene, Crop Genetics, DNA Plant Technology, Ecogen, and Mycogen.

throughout May. This is reflected by the C&EN stock price index in which several of these companies are represented. Although they have not returned to their former highs, Amgen, Chiron, Genetics Institute, Gensia, Genzyme, Synergen, and Xoma have made strides toward recovering some of their stock values.

Among agricultural biotechnology companies, although the stocks have never had the market value of biopharmaceuticals, stock prices were not hit as hard and have recovered somewhat more on a percentage basis. Calgene's stock came back very strongly, buoyed by the recent position of the Food & Drug Administration on genetically engineered foods (C&EN, June 1, page 5). Mycogen, with the only two approved genetically engineered biopesticides, saw its stock price drop 31% between January and April but has since seen it rise and become relatively stable. This has made some view agricultural biotechnology, long the stepchild of the industry, as a better bet in a volatile time.

For most other companies, stock prices are lingering near or only a few dollars above their 52-week lows and much below their 52-week highs. These companies will need real results—development milestones, products, and eventually profits—to pull themselves up. In addition, along with the quantity of offerings in 1991 came questions of the quality of new companies. Whether these companies survive and warrant higher stock valuations will be a test of their scientific and management merit.

Expectations for the future are somewhat mixed as to whether biotechnology stocks will surge once again. Most analysts seem to believe that this is not likely, certainly not in the near future. Recent optimistic notes for the industry are the government's positive outlook on biotechnology, the appointment of a new FDA chief for biologics, and an increase in the number of FDA examiners for biopharmaceuticals, all of which are expected to help move products through to commercialization at a faster rate.

Despite the plunge in stock values and the pessimistic outlook toward recovery, many companies have gone ahead with public offerings of stock. According to a recent report in *Bio/Technology* [**10**, 481 (1992)], 37 companies raised $1.3 billion in the first quarter of 1992 with public offerings. However, the amount of money raised tapered off dramatically throughout the quarter. □

Biotech stock prices fall from all-time high

Company	May 1992 High	May 1992 Low	May 1992 Close	52 weeks[a] High	52 weeks[a] Low
BIOPHARMACEUTICAL					
Affymax	$21¼	$17¼	$20	$41¾	$15
Agouron Pharmaceuticals	13¼	11⅜	12¼	24	10¾
Alkermes	14	10	10¼	28¾	8½
Amgen	61	53⅛	61	78¼	35⅜
Applied Bioscience	18⅝	13⅝	13⅞	20⅛	12⅝
Athena Neuroscience	9¾	7¾	8½	18½	7½
Biogen	25¾	21½	25¾	49	18¼
BioTechnology General	8	6½	7⅜	11¾	3½
Cambridge Bioscience	9⅛	7¾	7⅞	12⅝	4⅞
Cambridge Neuroscience	7¾	6	6	14¾	4¾
Centocor	12¾	10½	12	60¼	9¾
Cephalon	12¼	8¾	9	19½	8¼
Chiron	55	41¾	55	79	34¾
Cor Therapeutics	11⅝	10½	11¼	22	7½
Curative Technologies	13⅝	7½	7½	23	7¾
Cytel	12½	8¾	9¼	22½	7¾
Cytogen	19¼	15	18½	34¼	12¼
Genelabs Technologies	7	5½	5¾	13⅛	5½
Genentech	29	26¼	29	36¼	24⅛
Genetics Institute	29⅝	28	29¼	33	25
Gensia Pharmaceuticals	38⅝	29¾	38⅝	46¾	12¾
Genta	9	7¼	8	18¼	6
Genzyme	51	42¾	51	66½	29½
Gilead Sciences	14½	11	12¼	24¼	10⅛
Glycomed	13¾	10	11	25	5½
Icos	9⅛	7½	8½	21½	6½
ImClone	13¼	9½	13¼	28	8
ImmuLogic	12½	9⅞	10¾	25	8¾
Immune Response	22¾	17¾	22¾	62¾	9½
Immunex	31¼	26¼	31¼	68	22½
Immunomedics	9¾	7	8½	17	6⅛
Isis Pharmaceuticals	10½	8¾	9¾	21½	8½
MedImmune	29¼	18½	18¾	55	10¼
NeoRx	4	3 11/32	3 13/16	6 7/16	⅞
Nova Pharmaceutical	5⅞	4⅛	5¼	10⅝	3⅞
Regeneron	14¼	11⅛	13¾	23¼	9¾
Repligen	13¾	11¼	12	30¼	9½
Scios	14¼	10⅝	14	26⅜	10¼
Synergen	47¼	38	47¼	75	21⅛
SyStemix	30¾	25	26	60½	19
Xoma	22¼	15½	20¼	31½	12¾
AGRICULTURAL					
Biosys	11¾	9⅞	10½	14¼	9½
Calgene	15⅜	11⅝	14¾	16	6½
Crop Genetics	7	5⅜	6½	12¾	3
DNA Plant Technology	7	5⅓	6¾	9⅛	3¼
Ecogen	9⅞	8½	9	14½	7
EcoScience	8¾	6¼	7½	12½	5¾
ESCAgenetics	10½	8¾	8¾	14⅛	5
Mycogen	15	13⅜	14½	19¼	11¼

a The 52 weeks preceding the last week of May 1992.